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ABSTRACT

New telecommunications vehicles expand the possible ways that business is conducted. The hypermedia portion of the Internet, the World Wide Web, is such a telecommunications device. The Web is presently one of the most flexible and dynamic methods for electronic information dissemination. The level of technological sophistication necessary to market products and transact business on the World Wide Web, however, has not been standardized. This study identifies several models of Web functionality. A website can simply transmit data, creating an electronic repository of information. Along with delivering files, a website can be interactive, so that information can be sent back to the Web server for processing. Lastly, a website can provide custom data delivery and secure transactions across the Internet. The sample of this study, major North American commercial banks, did not produce websites of the same magnitude as one another, with comparable message content, or utilizing similar Web technologies. Standard guidelines for information presentation and organization were not apparent. While websites that employed more glamorous Web technologies were visually appealing and functionally interesting, the quality of the information and its organization on a website had little to do with the degree to which advanced Web technologies were employed. A list of uniform resource locators (URLs) for the top commercial banks are appended. (Contains 20 references.) (Author)

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HOW COMMERCIAL BANKS USE THE WORLD WIDE WEB: A CONTENT ANALYSIS

A Master's Research Paper submitted to the
Kent State University School of Library Science
in partial fulfillment of the requirements
for the Master of Library Science

by

Lydia K. Leovic

May, 1997

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ABSTRACT

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CHAPTER 1: INTRODUCTION

Background

The development of new telecommunication devices has regularly expanded the possible number ways that business is conducted. The first telecommunications instrument was the telegraph. In 1855, Congress authorized a telegraph line to connect the Mississippi River with the Pacific Coast, eleven years after Samuel F.B. Morse first demonstrated the telegraph's practical application. Morse's was the first mechanism to allow for distant communication by way of electrically-transmitted audible signals. It was embraced by the railroads, the first large American corporations.[1]

Sophistication in the transference of sound waves increased rapidly, and less than twenty-five years later, in 1878, the first *commercial* telephone exchange was introduced in the United States. Throughout the next five decades, the transmission of visible signs was perfected, and in 1939 the British Broadcasting Corporation established the world's first commercial television system. The latest telecommunications vehicle with numerous business applications is the Internet, especially its hypermedia portion, which is referred to as the World Wide Web.

For more than its first twenty years, the primary users of the Internet were the Department of Defense, universities, and research institutions all of which agreed to limit the Internet to noncommercial uses. Indeed, the initial purpose of the U.S. military computer network, ARPNET, was to establish a nuclear-attack-proof computer network

nationwide. Not until 1992 did the National Science Foundation change its "acceptable use policy" for the Internet to include commerce. The following year, Internet Service Providers (ISP) were permitted to sell Internet connections to individual users. The removal of these restrictions, coupled with the release of the Mosaic browser, a graphical interface for the World Wide Web, caused an explosive 341,634% annual growth rate in traffic on the Internet in 1993.[2]

In 1995, the Internet was left in commercial hands as the National Science Foundation's network, the NSFNET, reverted back to a research project.[3] As of October 1996, there were an estimated of 37.8 million total users (18 years and older) of any Internet service and 27.0 million total users of any Internet service excluding email.[4] Currently, the bulk of Internet traffic is on the World Wide Web.[5]

The degree to which commercial enterprises succeeded in using the Web to develop their businesses, expand their profits, or reduce their expenses is somewhat unclear. According to O'Reilly & Associates, only 14% of Web users (2.5 million) have shopped over the Internet. Yet, only 57% of the large businesses surveyed in June 1996 believed that Internet technology had improved the business environment, while 35% perceived no change.[6] The level of technological sophistication necessary to market products effectively and confidently transact business has yet to be determined.

Presently, several degrees of Web functionality can be identified. Companies can simply transmit data, thereby creating an electronic repository of information, viewable by any interested party with Internet access and a Web browser. In addition to delivering files, a Website can incorporate some level of interactivity, where end users can send

information *back* to the Web server to be processed. A common example of this ability is a search engine: The user queries the server to retrieve a discrete set of documents satisfying specific criteria. Lastly, a more sophisticated Web server can incorporate encryption technology, which provides for secure business transactions across the Internet.

Need for Study

Financial intermediaries are necessary fixtures in market economies that utilize some form of currency to facilitate the exchange of goods and services. Examining the manner in which this homogenous market used a new telecommunications paradigm in this case, the World Wide Web, helped determine if patterns in commercial electronic communications existed. Since most retail banks sell similar goods and services, partly due to government regulation, studying the patterns in their Web pages allowed for more potentially meaningful results than comparing, for example, the Websites of soup producers and automobile manufacturers.

Web technology provides commercial banks with the opportunity to advertise their products and services; it also offers a new dynamic model for conducting business. As the Web reaches an initial stage of maturation, investigating its commercial use across a specialized segment of the corporate population (such as large banks in North America) gives an indication of whether the World Wide Web is an effective means of doing business or a passing marketing fad.

Purpose of Study

The purpose of this study was to analyze, from several different viewpoints, how major commercial banks in the United States, Canada, and Mexico were using the World Wide Web. Demographically, estimates of the file-type sizes on each Website were made, along with estimates of how many other Web pages were linked to them. From a communications perspective, the content of corporate Websites ranged from basic information, such as addresses and products, to strategic messages and online banking. With respect to technology, the level of functionality in Websites varied significantly. Ultimately, this study's purpose was to examine the message—and the vehicle for delivering the message—for top North American commercial bank Websites.

Limitations of Study

Electronic communications have been used for banking for many years. For instance, the U.S. Federal Reserve Board's FedWire has been the electronic network for the transfer of funds between financial institutions throughout the United States since the 1920s. This paper did not study all telecommunications vehicles used in modern retail banking.

How commercial banks use other Internet applications, including FTP, Telnet, and Email, was not separately discussed here. Furthermore, even though much Web content changes daily, the analysis of each Website occurred at only one point in time, as opposed to over time.

Finally, this paper did not address the future of payments across the Internet, even though this issue is extremely important to developers of Internet applications. At present, much electronic commerce is facilitated through encrypted credit card transactions. Internet cash products, like CyberCash, do exist but the use of electronic currency is still in its infancy. Improving consumers' trust in electronic payments and the security of online transactions, while vital to the success of the Internet marketplace,[7] but is beyond the scope of this study.

Definitions of Terms

Active X: Microsoft's set of programming tools for building interactivity with users into Web pages and application programs. Active X is comparable to Sun Microsystems's Java.

Client: A program that requests data from another computer. The computer interface manipulated by the end user for this purpose is sometimes called the client. Mosaic, Netscape Navigator, and Internet Explorer are examples of client-side World Wide Web browsers.

Common Gateway Interface or CGI: A standard computer programming script often used to connect external gateway programs, like databases, with a Web server.

Cookies: see *Narrowcasting*.

Email: Electronic messages, usually transferred over the Internet.

Graphical User Interface or GUI: A computer interface that enables digital images to be viewed on-screen.

File Transfer Protocol or FTP: The telecommunications protocol that allows for file transfer between two remote computers, irrespective of their underlying operating systems.

Home page: The initial or start-up World Wide Web file of an organization or individual, usually meant to be a gateway to its collection of multimedia files, which are deliverable over the Internet.

Hyperlinks: A designated string of characters, usually a word or phrase, or a graphical image, which is semantically linked to another point, either within the same file or to a completely different file. Clicking on this designation will transport the user to the new position by way of the new position's URL. This process is usually transparent to the client.

Hypermedia: Richly formatted text, graphics, sound, movies, and executable files, usually containing hyperlinks.

Hypertext Mark-up Language or HTML: The code defining the collection of styles used in World Wide Web document files. HTML is a SGML DTD (document type definition) specific to the Web.

Hypertext Transfer Protocol or HTTP: The telecommunications protocol specific to the section of the Internet called the "World Wide Web."

Internet: The international computer network which links tens of thousands of businesses, universities, and research organizations with millions of individual users.

Java: A platform-independent computer programming language, designed to run computer applications through a Web browser. Java is a compiled language derived from C++.

JavaScript: An interpreted programming or script language from Netscape, similar to other CGI script languages. Scripts are easier and faster to code in than the more structured and compiled languages, like C++, and are ideal for programs of very limited capability or those that can reuse and tie together existing compiled programs.

Kbps: One thousands bits per second.

Lynx: A keyboard-oriented, text-only Web browser that was developed at the University of Kansas primarily for students who used UNIX workstations.

Kilobyte or KB or K: A unit of computer memory capacity equal to approximately one thousand bytes, and a measure of bandwidth.

Narrowcasting: The automated Web server process whereby the server gathers information about the preferences or Web-browsing behaviors of the client. This is done by passing the client a *cookie*, which occurs when the server makes a notation in "cookies.txt" file in the Web browser's subdirectory.

Portable Document Format or PDF: The Adobe Corporations' proprietary electronic document delivery format, which allows a file to maintain its textual and graphical layout. It is especially used for delivering print publications electronically in their original format.

Shockwave: Interactive multimedia files created with Macromedia's Director software.

Secure Sockets Layer or SSL: a protocol, designed by Netscape, for providing data security layered between application protocols (such as HTTP, Telnet, NNTP, or FTP) and TCP/IP. This security protocol provides data encryption, server authentication, message integrity, and optional client authentication for a TCP/IP connection.

Standard Graphical Mark-up Language or SGML: the general framework for describing document structure.

Telecommunications: The science and technology of long-distance communication by electronic transmission of impulses, as by telegraph, cable, telephone, radio, or television.

Telnet: The computer software utility which allows an end user to use the resources of another computer, remotely.

Visual Basic or VB script: An interpreted script language from Microsoft, similar to Javascript.

Uniform Resource Locator or URL: The *unique* identification for a file on the Internet.

Website or Web-presence: An organization's collection of electronic files or documents, generally meant to deliver a consistent message to its intended audience.

Web server: The computer which delivers files requested by a remote user or "client" using HTTP.

World Wide Web or Web or WWW: The graphical user interface portion of the Internet which uses HTTP to transfer hypermedia. Rather than being hierarchically arranged, these files tend to be connected via hyperlinks, or semantic relationships. Typically, these files are accessed by way of a client/browser utility, such as Mosaic, Netscape Navigator, or Internet Explorer.

CHAPTER 2: LITERATURE REVIEW

Commercial Banking and the World Wide Web

Tim Beckham, writing in Agency Sales Magazine, explains the Internet's ability to instantaneously connect businesses with their customers in an unprecedented fashion. He describes the World Wide Web, in particular, as the business hub of the Internet, where companies attempt to attract maximum attention. He noted that the Lycos search engine lists a wide variety of companies that are currently pioneering the Internet's potential. In September 1996, about 7% of these Websites were in banking and financial services.[8]

Of banks surveyed, over 75% currently have a Web presence, according to Sharona Talmor, reporting for Banker. Managers of financial institutions expect the Web to act as a distribution channel for products and services and to augment brand awareness. Banks with no intention to engage in Internet commerce attribute their reluctance to both security concerns and the perception of inadequate cost benefits.[9]

In the July 1996 edition of America's Community Banker, an article by Steven Davidson portrayed the evolution of banking on the Internet in a moderate tone. A bank's strategic goals will determine if it sets up a Website, and whether its home page will act as an advertising service or a vehicle for conducting actual online transactions sometime in the future Furthermore, the use of Web technology should match a financial institution's customer profiles. The author noted a recent study by Booz, Allen & Hamilton, Inc., which concluded that of those financial institutions with a Web presence,

77% used only basic Web technology to transmit general information about their products and services. However, 90% of those companies planned to introduce some level of interactivity into their Websites within one year.[10]

Magdalena Yesil, cofounder of CyberCash, talked about the unexpected growth and popularity of the World Wide Web in Credit Union Management. The Web boom has left many financial institutions and merchants scrambling to take advantage of this new distribution channel. She noted one study which forecasts that purchases of goods and services over the Internet will amount to $600 billion over the next six years. This figure could represent 8% of global purchases.[11]

Marketing Financial Products on the Web

The marketing departments of many firms overlook interactive medias' unique qualities and treat them as if they were conventional one-way distribution channels, like television and print media, according to a team of writers at the McKinsey Quarterly. A new business model needs to be developed for online commerce, primarily because the World Wide Web allows a dialogue between companies and their customers. Three interactive media models are described: the information-delivery opportunity, the relationship-building opportunity, and the channel/(dis)intermediation opportunity. The five factors necessary for any of these models to be successful are the ability to attract users, engage their interest, give them reason to return, determine their preferences, and provide personalized products and services.[12]

A recent piece in U.S. Banker describes the difficulties bank marketing departments have in taking advantage of electronic communications. Although many banks have developed Websites, they communicate the same marketing message on the Web as they do in their print media, relying on graphics to impress their cyber-audience. In addition, the article explains that bank marketing managers enjoy the ability to measure the number of hits on their Website, and thereby to judge its cost effectiveness.[13]

In Credit Union Management, several directors of financial institutions discuss their vision of Internet banking now and in the future. Web technology's success will initially be judged by its ability to lower operating costs or increase customer service. One business leader suggested that the Internet could be used as a "town hall", building a virtual reality, rather than simply promoting products. Going beyond a one-way communication model is essential for successful Internet commerce. Developing interactive applications, the ability to conduct online transactions, and acting as a link to the community are strategies for creating a cost-effective Web presence.[14]

Web Technologies and Banking

Many banks are realizing that creating an interactive Website, viewable with a standard Web browser, is more cost effective than developing proprietary computer software for online banking, according to Kim Girard's article in Computerworld. In the near future, banking software interfaces will need to be highly interactive, allowing customers to manage their accounts online.[15]

Sadu Thinakal's Mortgage Banking article provides a detailed discussion of the technological innovations available to businesses on the Internet. Websites inherently broadcast information, but technologically savvy companies can use the Web to narrowcast, or tailor their message to specific clients. The author describes the Web as a level playing field for general information or "brochureware," but observes that firms which provide the most value-added ability to transact business conveniently will have more success on the Web. Indeed, banks which use the Web only to post their interest rates may be driving customers away, unless their rates are the best in the marketplace. [16]

In the McKinsey Quarterly, John Hagel and A. M. Sacconaghi talk at length about the value of capturing online information, including details about both consumer-realized and potential purchases and preferences. Understanding how consumers use a company's Website can be a complex process. Counting "hits" can be misleading, because a home page may contain many graphics and therefore generate what appear to be multiple hits for one document. In contrast, if a home page is cached on the client side, the hit will not be counted by the Web server. In addition, several strategies exist that tie user activity profiles to individual consumers. A Website, such as that of the *New York Times*, can either require registration or embed a unique identifier in the user's Web browser.[17]

CHAPTER 3: METHODOLOGY

Sample

For the purpose of this content analysis, major commercial bank Websites in North America were defined as the top commercial and savings banks ranked by financial assets, with headquarters in the United States, Canada, or Mexico. These rankings were as of June 30, 1995, according to the *Thomson Bank Directory* (December 1995 – May 1996 edition). Even though more recent editions of *Thomson's* have been published, the editors of that directory changed the classification from top North American banks to top United States banks since that issue. The inclusion of Canadian and Mexican financial institutions was an attempt at making the analysis richer, despite the sacrifice of currency.

During the sample period—December 1996 through March 1997— each Website was examined once. Possible changes in the structure and content of the discrete Website, after each individual examination was completed, were not addressed. Sites were examined in descending order, starting with the institution with the most financial assets until a sufficient amount of observations were collected.

Data Collection

Each site was opened with the 32-bit version of the Netscape Navigator 3.0 Web browser, with plug-ins for Shockwave, audio, and video, on a Windows 95 operating

system with a 33.6 Kbps modem, which included multimedia-capable hardware, like sound and video cards. All the potential functions of a Website, including Java and Active X, which can only run in a 32-bit operating system environment, were viewable. Home pages were viewed with the graphics both on and off.

Banks were located on the World Wide Web using two different online tools. *The AAAdir Directory of World Banks*, which is a comprehensive listing of Banks arranged both alphabetically and geographically, was used first. If the institution could not be found using this resource, *Hotbot*, one of the more comprehensive global Web search engines, was employed with the "Exact Phrase" option and the bank's legal name. If this strategy was not fruitful, some additional search techniques were applied, including Boolean operators.

Public service Web pages, which included listings of banks, compiled by local chambers of commerce or a similar directory service, were fairly common. Even if a bank's name and address were included in such a directory, a separate corporate bank Website for that institution was not counted for the purposes of this study.

Of the top 70 banks on the *Thomson's* list, only 42 discrete Websites were identifiable. Some banks simply did not have Websites, while others shared Websites. Because of the complex nature of the U.S. banking industry, banks often have charters in different states but are under the same parent or holding company. Consequently, many of the top commercial banks have the *same* Website. In some instances, this structure was particularly obvious because the banks had the same name but were based in different states. For instance, NationsBank has locations in Georgia, Florida, Virginia,

Texas, and North Carolina, which were technically not branches, but separate banks under one holding company. Additional complexities in the structure of the banking system were caused by recent bank mergers and acquisitions. When banks merged or were acquired, their Websites apparently were absorbed into that of their parent company.

The U.S. banking industry is in a constant state of reorganization. Bank mergers and acquisitions have been very commonplace, and many have occurred since June 30, 1995. For instance, Chemical Bank, listed third in terms of asset size on the *Thomson's* list, and Chase Manhattan Bank, listed tenth, merged in 1995. More difficulties in discerning which bank now owns another arose when multiple banks acquired one institution, whose branches they divided among themselves. Even under these circumstances, however, no instances of a residual separate corporate identity after such a merger or acquisition were observed.

Data Categorization

Each bank's Website was examined using three broad categories: basic demographics, message content, and Web technologies used. The categories of Web technologies utilized were subdivided into three broad models: one-way communications, basic interactive communications, and advanced interactive communications. The file types which fell into these three groupings were noted and discussed.

Basic demographics included the ranking by assets, the bank's legal title, the location of the headquarters, the bank's URL, estimations of the number of individual

Web pages (< 25, 25–50, 51–75, 75–100, >100) and the number of graphical images per home page by file size (< 25, 25–50, 51–75, 75–100, >100), and whether the Websites were presented in more than one language. Graphical images were not counted as Web pages unless they were presented as stand-alone pieces of information. A sample of graphics was saved to the PC hard drive and those file sizes were compiled to make an estimate of the total KB per home page. Lastly, the Hotbot search engine was used to determine the number of Websites hyperlinking to an individual bank's Website.

The message content of the banks' Website was examined and quantified, including addresses and phone numbers, products and services, interest rate information, press releases, mission statements or other strategic communications, banking industry news, job opportunities, online banking options, advertising banners for other companies, and other miscellaneous information.

One-way communications model Websites were those where information could only be requested *from* the server, with no means of allowing the end user to send information back *to* the Web server. Included in this category were Websites that may have had an email contact, since sending email though a Web browser does not typically involve the Web server itself, but a mail server. Basic Web file types were noted, including HTML, PDF, graphics, audio, and video. A Website did not have to be interactive to be a useful information resource, but good basic information design choices were noted. Some of these choices included providing textual hyperlinks as well as graphical hot buttons to navigate through the information, and the use of text "ALT" HTML tags in conjunction with graphics. These designs would allow the user of a

nongraphical Web browsers, like the Lynx browser, or someone browsing the Web with the graphics off because of a slow modem, to successfully move through the Website's information. Another extremely useful design feature was employing a sitemap for the Website. A sitemap allows the user to see at a glance where to go for the desired information and is especially useful if the Website does not include a local search engine.

Basic interactive communications included Websites that use some rudimentary scripting language, like CGI, to enable client/server communications. Two of the more common types of interactive utilities are feedback forms and local search engines. Feedback forms allow the user to send information, like a request to be added to a mailing list, directly to the Web server. Search engines allow the Web server to accept a query from the user, match that query with the search function's inverted index, and return the hits, often based on some percentage confidence level. Other basic interactive features include counters, which indicate the number of hits to a Web page, and scrolling marquees, which could provide continuously updated information, using scripting languages like JavaScript or VB Script. The presence of scripting was noted and examined.

The advanced interactive model incorporated client-side executable applications, like Java and ActiveX, locked or encrypted pages for secure information transfer to the Web server, and *narrowcasting* or "passing a cookie." This form of custom data delivery amounts to transferring code to the end user's Web browser to be referenced by the remote Web server the next time it is contacted. Using the 32-bit version of Netscape Navigator 3.0 was essential in order to make a judgment about these types of

functionality, because not all Web browsers have the capacity to display executables, perform encryption, or allow narrowcasting. Secure transactions and "cookies" were evidenced by an alert set up in Netscape's Navigator's *Preferences*. This alert caused a dialog box to pop up in Netscape when a secure Web page was requested in order to accept a "cookie." The dialog box prompted whether or not to proceed. In addition, encrypted Web pages were indicated in the Netscape interface by an unbroken key in the lower left-hand corner and a heavy blue outline around the secure Web page itself.

CHAPTER 4: ANALYSIS OF DATA

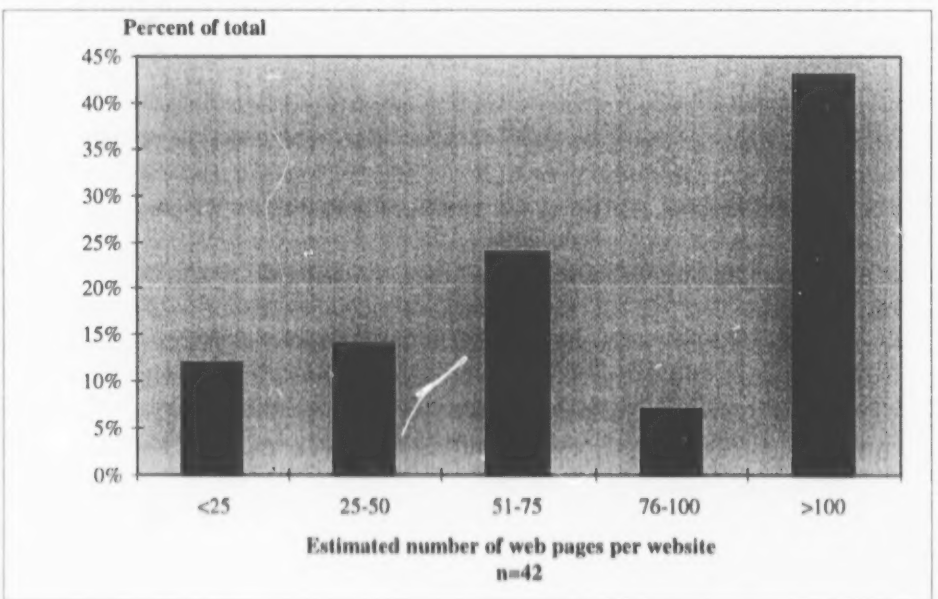
Despite the fact that the products and services of major North American banks are similar and highly substitutable, the degree to which these financial institutions use the World Wide Web to disseminate information and conduct business varies widely. Practically all of the Websites contained product information, and HTML was the basic presentation standard to which all of the Websites adhered. No consistent application of more complex Web technologies among banks was apparent, even in the presentation of similar information. This inconsistency ranged from simple considerations, like the file sizes of graphical images on a home page, to potentially critical choices, like whether a site supports secure transactions.

Website Demographics

The World Wide Web is a telecommunications vehicle that major commercial banks are undoubtedly embracing, at least to some degree. Fifty percent of the Websites examined were estimated to have had more than 75 Web pages. A bank's Website does not have to be large to be useful. Basic descriptions of products and bank directory information may answer a large portion of their online customers' questions. The size of a bank's Web presence may indicate the amount of resources these institutions are allocating to this telecommunications vehicle and the value they place on its effectiveness, but no relationship between a bank's assets and the size of its Website was obvious.

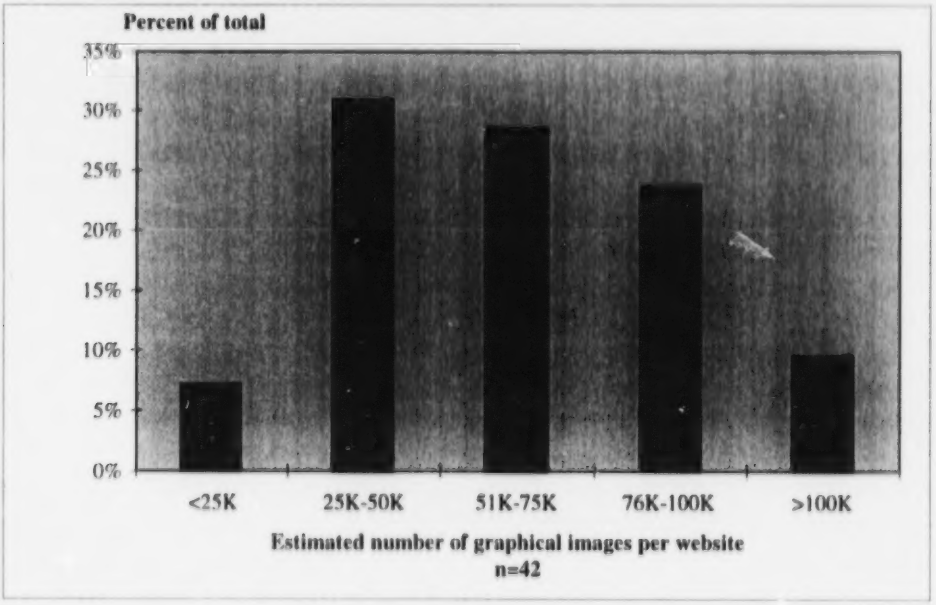
Firmly grasping the number of files that make up a Website can be elusive, especially because no physical constraints exist for electronic documents versus their print counterparts. Electronic documents are often broken down into separate files representing each chapter or subtopic, with all of these documents hyperlinked together. But, for the purposes of this study, Websites that featured many electronic periodicals easily fell into the >100 Web page category. Following an attempt to count files, it became clear that counting units of information or *complete* electronic documents would have been more meaningful than estimating the number of individual computer files that reside on a Website.

FIGURE 1: ESTIMATED NUMBER OF WEB PAGES PER TOP COMMERCIAL BANK WEBSITE



Examining the graphical interface of each major commercial bank Website provides some observations about who these institutions thought their audience was. In general, banks seem to assume that their online customers would have Web browsers capable of displaying graphics. At least 10% geared their home pages toward technically savvy end users whose computers had a significant amount of processing power and a fast modem. All home pages included some graphics, with file size estimates ranging from 5K to over 175K, which factored into the speed at which a site could be opened. On average, the bank Websites included approximately 60K worth of graphical images on their home pages. While the graphics ranged from simple and functional to complex and visually outstanding, a detailed discussion of electronic graphics is beyond the scope of this study.

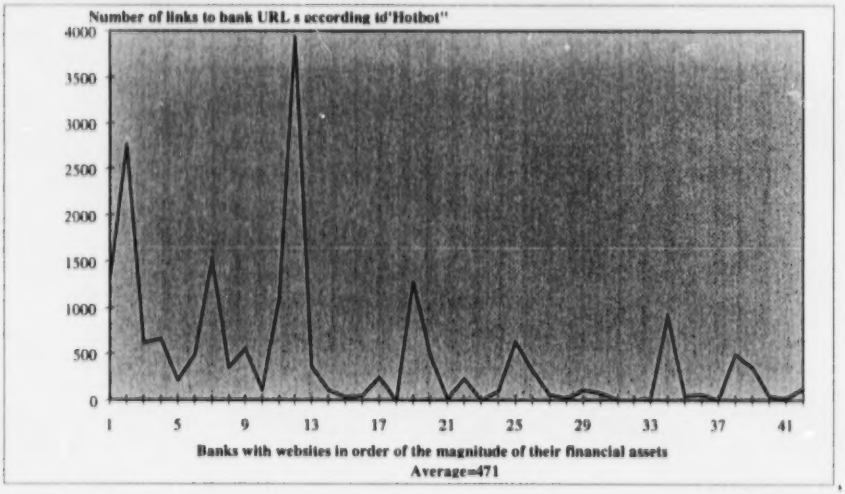
FIGURE 2: ESTIMATED NUMBER OF GRAPHICS FILE SIZE PER TOP COMMERCIAL BANK HOME PAGE



Another general observation about the top commercial bank Websites in North America was that less than 30% provided Web pages in languages other than English. All of the banks in Canada and Mexico provided separate sets of Web pages for their non-English-speaking clientele, but only three banks that were based in the United States had multi-lingual Websites.

In general, a Website's popularity can be measured by the number of visits that people make to it. These visits or "hits" are recorded on the Web server itself. Some Websites include a counter, which displays a running total of hits to a page. Of the commercial bank sites examined, however, only *one* included a counter, so counters could not be used to compare the popularity of these home pages.

FIGURE 3: NUMBER OF LINKS TO A BANK'S HOME PAGE



Another strategy for getting a general idea about the perceived usefulness of a bank's Website is to determine the number of *other* Web pages that hyperlink to it. The

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Hotbot search engine has an option to search the Web for links to an individual URL. Each bank home page URL in this study was searched using this feature. The number of hits that Hotbot returned, while ranked for relevance, was purely quantitative, and no indication of the quality of the hyperlink could be determined. Consequently, these data must be carefully scrutinized.

Any person or institution can include hyperlinks to other Web pages in their individual home pages. No formal mechanism for requesting permission to hyperlink *to* another site exists nor is such a mechanism likely to be implemented in the future. Assuming that a hyperlink is always an implicit endorsement of the information on a Website may be incorrect, since a Website can be referenced as an example of what to avoid. Furthermore, this Hotbot search engine function appears to count files *within* a Website that hyperlink back to the home page. So, in addition to being a possible indicator of the number of pages hyperlinking to a given Website, this measure may also indicate an individual Website's scope. Separating out these two gauges could be the focus of subsequent analysis, but is beyond the scope of this study.

Website Content

World Wide Web pages are, by their very nature, repositories of information. But, no medium for disseminating information is as dynamic and flexible as the Web. Consequently, institutions can choose from literally an unlimited number of formats to communicate their message electronically. Banks uniformly showcased their products on their Websites, but fundamental features of financial products, like the interest rates associated with particular credit cards, were apparent in only one-third of the cases examined. This observation could have been the result of several different factors, ranging from an explicit marketing strategy that would compel a potential customer to telephone the institution for current interest rates, to not having the technological or human resources to maintain such timely information on a Website.

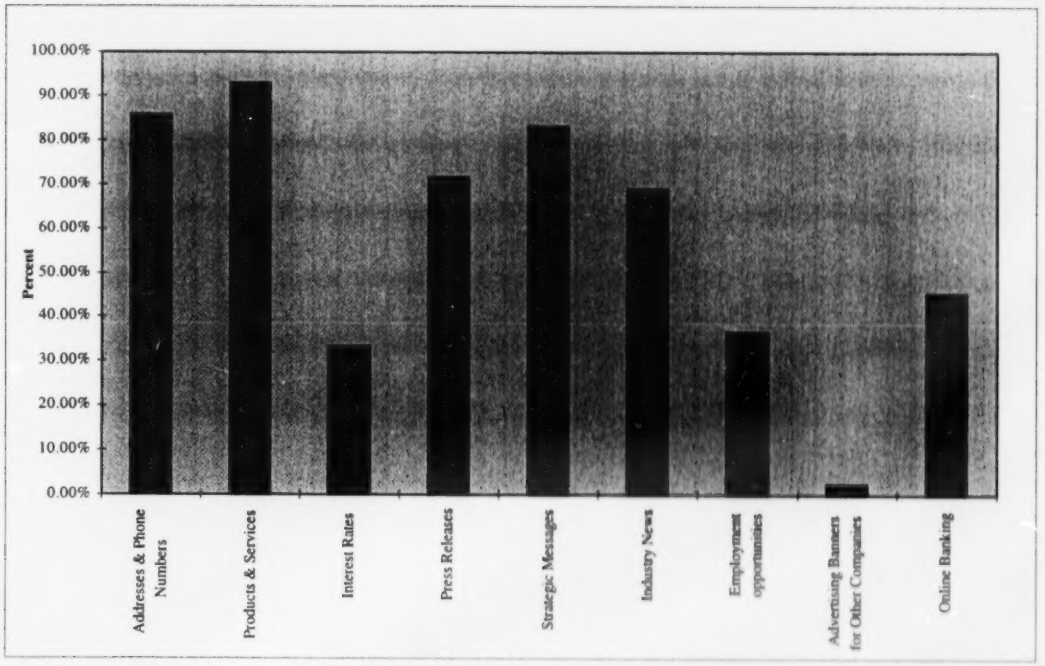
Basic business directories, including addresses of bank branches and telephone numbers, was not universally present on all of the Websites viewed, either. In some cases, transactions could indeed be conducted online, thereby removing the need for a physical office and related directory information. Some other Websites, however, simply did not include these fundamental facts, or did not present them in an obvious manner.

Many banks appeared to take advantage of the Web to broadcast strategic messages about their business, which may be of vital importance to a firm in a homogenous market, like the banking industry, where competition is fierce and products are highly substitutable. Of the cases analyzed, over 80% included their mission statement, more than 70% listed company press releases, and 36% posted job opportunities. In addition,

many banks published economic research and industry news, thereby increasing the potential usefulness and widening the audience of their Websites.

Forty-five of the bank Websites visited advertised some form of online banking. This service was usually offered in conjunction with another software product, such as *Quicken* or *Microsoft Money*, rather than being based solely on Web technologies. In the near future, cross-platform Web programming languages, like Java or ActiveX, may be able to replace proprietary software for online banking. Understanding the details of how Web programming languages and these financial software products enable a bank to conduct business online is beyond the scope of this paper, however.

FIGURE 4: COMMERCIAL BANK WEBSITE CONTENT



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Using the Web as a *primary* form of advertising products, communicating strategic messages, and posting jobs may currently be inappropriate. Yet, the Web is a telecommunications vehicle that can clearly *supplement* traditional media. Consequently, corporate online information should be structured with great care. Ironically, in an industry which has problems establishing brand image, at least one financial institution "sold" a portion of its home page to an outside firm. The bank provided space on its homepage for an advertising banner which also acted as a hotlink to the other company's Website. This choice may have distracted the attention of people browsing the bank's Web page. Functionally, it gave end users with the choice of *leaving* the institution's Website as soon as they got there.

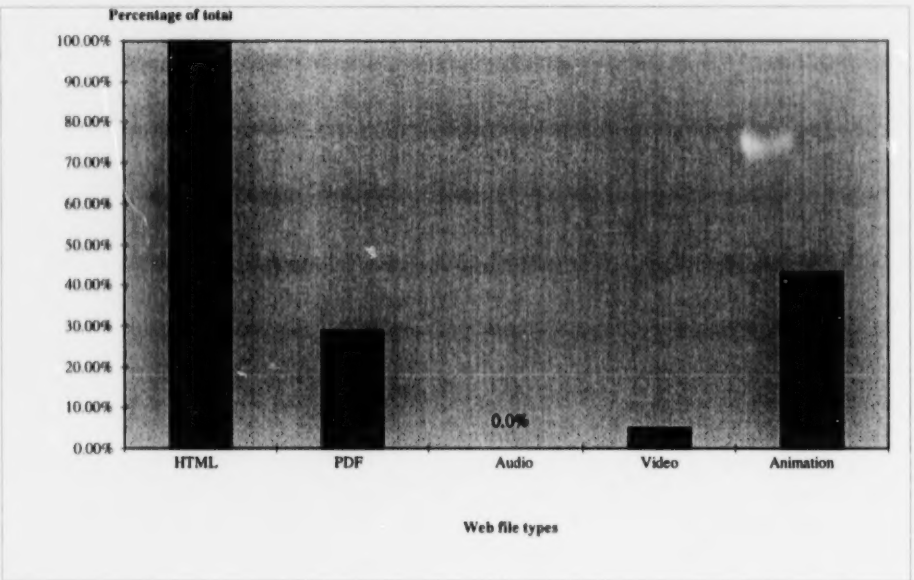
Many commercial bank Websites included a variety of miscellaneous additional information not directly related to their business, including educational children's activities, information on local cultural and sporting events, historical facts about currency, travel adventures, and online shopping. These features added color and entertainment value to the Websites, apparently in an effort to attract those surfing the Web to their home page repeatedly, even if they were not necessarily in the market for financial products.

Web Technologies

HTML, the basic language of the Web, has created a level playing field where any individual or organization can publish hypermedia. No formal agent is required to

disseminate information on the Web, other than a Web server, which can range from a university's mainframe to a home PC with a modem. Some minimal technical understanding of how to migrate files to a Web server is needed as well as a rudimentary knowledge of HTML. The major strength of this mark-up language is its ability to be interpreted uniformly by any operating system, including UNIX, Windows, and MacIntosh. It remains the backbone of the World Wide Web, and upgrades to HTML standards occur constantly. But other cross-platform scripting codes and programming languages have joined HTML as prolific Web technologies.

FIGURE 5: ONE-WAY COMMUNICATIONS MODEL
WEB TECHNOLOGIES USED



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All commercial bank Websites used HTML, and no there were no examples of Websites based entirely on dynamic HTML creation, as would be the case with a Website based on Lotus Note's Domino Web server.

HTML layout is dynamic, and precise formatting with this code is not always possible. Modifying the size of the Web browser interface causes the text to be automatically reformatted to fit the width of the available view space. When preserving a document's layout is highly desirable, it is possible to create PDF documents with Adobe Acrobat software instead of HTML. In addition, the appearance of an HTML document often varies on different Web browsers (for example, Netscape Navigator versus Microsoft Internet Explorer). PDF documents, on the other hand, can be viewed *only* with Adobe Acrobat Reader software, and consistent presentation is therefore virtually guaranteed.

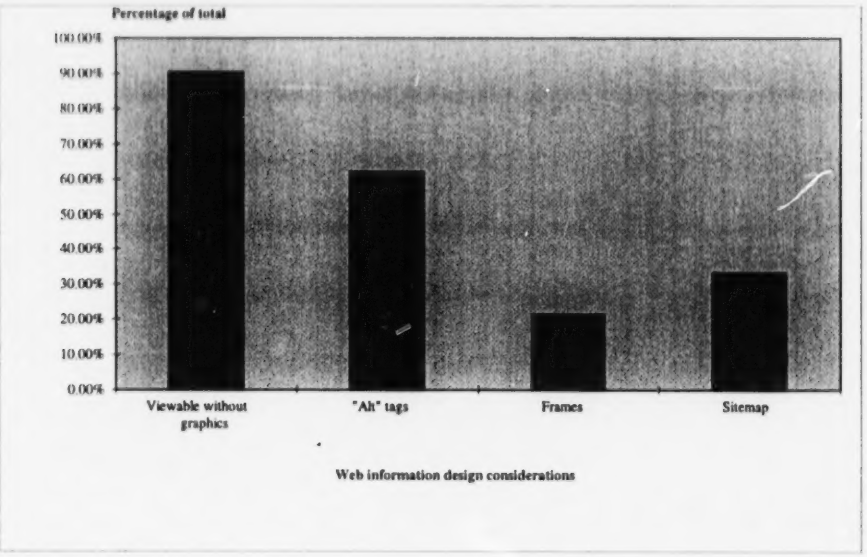
Examples of PDF files were present in less than 30% of the commercial Websites reviewed in this study, however. There are several possible explanations for the relatively low occurrence of PDF documents, including reluctance to force customers to download and install the relatively resource-intensive Adobe Acrobat Reader, long download times for PDF documents, and non-intuitive navigation within these documents. PDF files were not very popular, despite their advantages of being easy to create from a variety of desktop publishing software, along with the preservation of a document's original layout and format.

All commercial banks used some graphics on their Websites. In addition, 43% of these pages included animated graphics, a popular file type which download quickly and

add a great deal of visual appeal to Web pages. While not all animated graphics can be viewed with every Web browser, the graphic's first frame appears as a stationary image, with additional frames invisible to the end user.

Video and sound files, which are very common on the Web, were virtually nonexistent on bank Websites. Two commercial banks in Mexico included video clips of television advertisements, but no examples of sound files were evident on any of the Websites.

FIGURE 6: ONE-WAY COMMUNICATIONS MODEL
WEB INFORMATION DESIGN



In conjunction with these basic Web multimedia file types, good information design strategies make basic Websites as useful as highly interactive ones. Graphical images can significantly increase download time over a modem, not all Web browsers can support graphics, and visually impaired individuals do indeed use the Internet. For these reasons,

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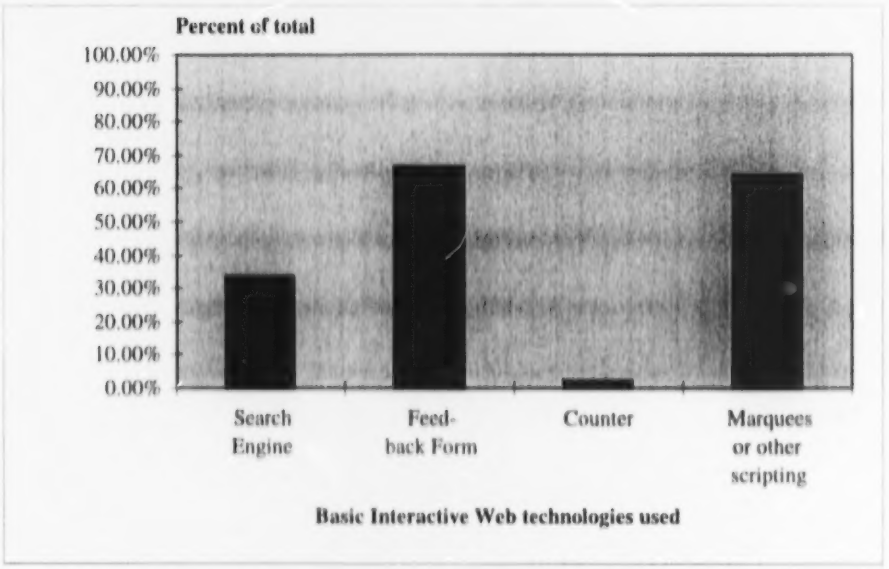
Web pages should be logical and useful even if the graphics are turned off. Of the commercial bank Websites studied, over 90% were structured so that information retained its usability without graphics. Sixty-two percent of the sites used HTML code in such a way as to label graphics, so that even if they were not downloaded with the text, the end user could get a description of the graphics.

Site maps are another very useful tool on Web pages, particularly those that are extensive and do not have a local search engine. Site maps describe, at a glance, the information contained on an entire Website. Of the commercial bank Websites examined, 33% included site maps. Some of the vaster Websites included both a search engine and a site map, but these represented only 14% of the total Websites in this study.

Frames are a dynamic way to format a Web page, but are a relatively new design style and not compatible with all Web browsers. Frames allow an index or table of contents to appear in a static portion of the Web interface, and clicking on these hyperlinks causes the desired file to be downloaded in another portion of the screen. Designing a Website with frames does not required any scripting or programming code, but frames are frequently used in conjunction with executable code. For example, only nine of the 42 financial institution examined used frames, but *all* of the Websites with frames also used some scripting, particularly in the form of a scrolling marquee.

FIGURE 7: BASIC INTERACTIVE COMMUNICATIONS MODEL
WEB TECHNOLOGIES USED



Basic interactive Websites are not a new phenomenon. Two-way communications models, where the end user can send information back to the Web server for processing, are facilitated by CGI scripts. A common application of scripting languages is feedback forms. Indeed, two-thirds of commercial bank Websites included feedback forms. These forms can allow a database to be directly updated from a Web browser, and therefore are very useful.

The primary limitation on CGI is the fact that the programmer must have write-access to the subdirectory of the Web server from which these scripting files are run. Consequently scripts, like JavaScript, which can be executed on the client's PC rather than from the Web server itself, have become very popular. Sixty-six percent of the commercial bank Websites reviewed included scripting in the form of a scrolling

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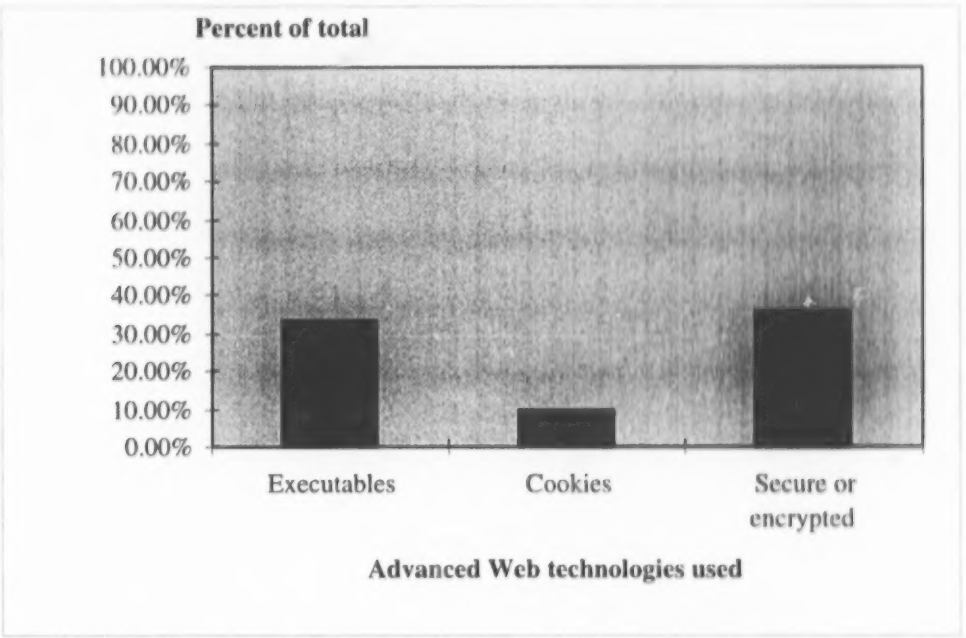
marquee. These marquees provided timely information, such as the date and the company's current stock quote.

A utility present on many Websites in general, but rare on top commercial bank Websites, was the counter, indicating how many people have visited a Web page. Only one bank included a counter on its home page. Perhaps financial institutions did not believe that the number of visitors to their Websites was meaningful information or data they wanted to share with the world.

From the standpoint of information science, the information has negligible value if it cannot be retrieved. Web sites can become vast and unwieldy. Someone surfing through a large site can easily get lost or distracted from the information originally sought. Consequently, local Website search functions are indispensable tools. Many after-market search engine packages are available for purchase, so the programming does not have to be done in-house. But, of the 18 bank Websites viewed that had more than 100 pages, only 10 incorporated a search engine. Four smaller bank Websites also had search capabilities. Therefore, of the 42 commercial bank Websites in this study, one-third had search engines. But roughly 65%, or 9 out of 14 , of these search engines could interpret Boolean operators. *Verity* appeared to be a search engine product commonly purchased for these bank Websites.

FIGURE 8: ADVANCED INTERACTIVE COMMUNICATIONS MODEL
WEB TECHNOLOGIES USED



Client-side Web applications are still in their infancy. Executable applications were noted on approximately 35% of the sites examined. Both Shockwave applications and Java Applets on commercial bank Websites tended to add a significant amount of visual appeal to the pages, but only minimal value-added information. The same information could have been presented with standard HTML. However, Websites may be easier to maintain with the use of advanced technologies.

Another new Web technology, which facilitates end user information customization, is narrowcasting (or "passing a cookie"). Not all Web browsers can accept "cookies." These bits of code allow the Web server to indicate which files on their Website the end user has previously visited. When the end user visits the site again, the

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Web server can directly gather information about the client's Web browsing behaviors. While narrowcasting does add value to the end user's Web browsing experience, it is primarily a marketing tool for collecting information about the user. Narrowcasting is somewhat controversial, because it can be invisible to the novice end user. Less than 10% of the bank Websites visited passed cookies.

The computer technology that is undisputably the deciding force behind the success of electronic commerce is encryption. Netscape's browser supports a secure sockets layer (SSL), which facilitates encryption. Sensitive information is scrambled before it leaves the desktop to travel through cyberspace, and is not decoded until it reaches the destination with the appropriate encryption key. More than 35% of the top commercial bank Websites in this study employed encryption to some extent. For example, several banks used secure Web pages to accept credit card applications from potential customers. Users who understand that encryption protects their sensitive financial information may be more willing to use the Web for commercial transactions than those who believe that information traveling across the Web in completely insecure.

CHAPTER 5: SUMMARY AND CONCLUSIONS

The development of new telecommunication devices has regularly expanded the number of possible ways to conduct business. The latest telecommunications vehicle with numerous business applications is the Internet, especially its hypermedia portion, which is referred to as the World Wide Web.

In 1969, the Internet was developed as a nuclear-war-proof computer network across the U.S. Consequently, its primary users were the Department of Defense, universities, and research institutions which agreed to use it for noncommercial purposes only. In 1992, the National Science Foundation expanded the Internet's "acceptable use policy" to allow for commercial applications, like advertising.

The World Wide Web is not only a contemporary telecommunications vehicle, but unmistakably one of the most flexible and dynamic methods for electronic information dissemination to date. The level of technological sophistication needed to market products effectively and transact business confidently on the World Wide Web has yet to be determined, although several models of Web functionality were identified in this study.

Companies can simply transmit data, thereby creating an electronic repository of information, viewable by any interested party with Internet access and a Web browser. In addition to only delivering files, a Website can incorporate some level of interactivity, where end users can send information *back* to the Web server to be processed. Lastly, a

more sophisticated Web server can incorporate end user customization of information, as well as encryption technology, which provides for secure business transactions across the Internet.

Because of all these technological options and developments, no standard guidelines for information presentation and organization were apparent in the sample for this study, and may never be plausible. Major North American banks, a homogenous market segment, did *not* produce Websites of the same magnitude, with comparable message content, or utilizing similar technologies. Almost every commercial bank Website examined featured information about their products and services, but few included vital details about those products. Furthermore, no trends in information organization were apparent in this sample. Many Websites could have used SSL encryption technology, such as for online credit card applications, but did not. While Websites that employed the more glamorous Web technologies were visually appealing and functionally interesting, the quality of the information and its organization on a Web page had little to do with the degree to which advanced Web technologies were employed.

Fundamentally, a business's success is based on its ability to market its products and services. The World Wide Web is a current telecommunications device which is very conducive to business advertising. But, the perennial success of *online* commerce relies on the ability to transact business confidently over the Web; therefore, the development and improvement of encryption technologies is critical. Secure transactions, while currently possible with Netscape Navigator and a few other Web browsers, are still in

their infancy. As the use of encryption technology becomes more widespread, and confidence in it is built, the viability of commerce over the Internet will increase. Firms may make a long-term investment in providing access to information about their business over the World Wide Web only if a return on this investment can be demonstrated through profitable electronic commerce.

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TABLE 1: Top Commercial Bank URLs

THOMSON'S RANK as of 6/30/95	BANK LEGAL TITLE	HEADQUARTERS	URL
1	Citibank	New York City, NY	www.citibank.com
2	Bank of America	San Francisco, CA	www.bankamerica.com
3	Chemical	New York City, NY	www.chase.com
4	Morgan Guaranty Trust Company of New York	New York City, NY	www.ms.com
5	Royal Bank Home Page	Montreal, Quebec, Canada	www.royalbank.com/english/index.html
6	CIBC Home Page	Toronto, Ontario	www.cibc.com
7	Bank of Montreal	Montreal, Quebec, Canada	www.bmo.com
8	Bank of Nova Scotia	Toronto, Ontario	www.scotiabank.ca
10	Bankers Trust	New York City, NY	www.bankerstrust.com
11	Home Savings Online	Irwindale, CA	www.homesavings.com
12	NationsBank National Association (Carolinas)	Charlotte, NC	www.nationsbank.com
13	Wells Fargo's WWW Home Page	San Francisco, CA	www.wellsfargo.com
14	First Chicago NBD Corporation	Chicago, IL	www.fcnbd.com
16	PNC Bank Home Page	Pittsburgh, PA	www.pncbank.com
17	The Bank of New York Home Page	New York City, NY	www.bankofny.com
18	Grupo Financiero Banamex-Accival	Mexico City, D.F.	www.banamex.com
19	Bank of Boston	Boston, MA	www.bkb.com
20	Grupo Financiero Bancomer	Mexico City, D.F.	www.bancomer.com.mx
21	First Union	Jacksonville, FL	www.firstunion.com
22	Mellon Bank	Greensburg, PA	www.mellon.com
23	Banca Serfin, S.A.	Mexico City, D.F.	www.infosel.com.mx/serfin
24	Bank of Canada Home Page	Montreal, Quebec, Canada	www.bank-banque-canada.ca:80
25	First Fidelity Home Page	Elkton, MD	www.first-fidelity.com
26	Republic National Bank of New York	New York City, NY	www.rnb.com
30	Comerica Bank	Detroit, MI	www.comerica.com
31	NatWest Bank, N.A./Fleet Bank	Jersey City, NJ	www.fleet.com
33	State Street Bank and Trust Company	Boston, MA	www.statestreet.com
34	Wachovia Bank of North Carolina, National Association	Winston-Salem, NC	www.wachovia.com
36	Society National Bank/Key Bank	Cleveland, OH	www.keybank.com
38	CoreStates Bank, National Association	Philadelphia, PA	www.corestates.com
40	The Dime Savings Bank of New York, FSB	New York City, NY	www.dime.com
42	Marine Midland Bank	Buffalo, NY	www.marinemidland.com
43	Union Bank	San Francisco, CA	www.tdmi.com/union
46	Norwest Bank Minnesota, National Association	Minneapolis, MN	www.norwest.com
50	Branch Banking and Trust Company	Winston-Salem, NC	www.bbandt.com
52	The Northern Trust Company	Chicago, IL	www.ntrs.com
59	Midlantic Bank, N.A.	Newark, NJ	www.wechsler.com/portfolio/midlantic/midlantic1.html
60	The Huntington National Bank	Columbus, OH	www.huntington.com
65	Crestar Bank	Richmond, VA	www.crestar.com
66	Banco Popular de Puerto Rico	San Juan, PR	www.bancopopular.com
67	Harris Trust and Savings Bank	Chicago, IL	www.harrissavingsbank.com
70	Bank of Hawaii	Honolulu, HI	www.boh.com

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